

STUDIES IN CAPPARACEAE XXVII:
SIX NEW TAXA AND A NEW COMBINATION IN *QUADRELLA*

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ABSTRACT

Six new taxa and one new combination are newly established within the genus *Quadrella* (DC.) J. Presl (Capparaceae s.s.) from the Dominican Republic and Central America. (1) *Quadrella alaineana* Cornejo & Iltis, a new rare endemic from Azua in the Dominican Republic; (2) *Quadrella dressleri* Cornejo & Iltis, a second detritophilous taxon described from eastern Panama; (3) *Q. incana* var. *triangularis* Cornejo & Iltis, a new variety endemic to coastal Jalisco, Mexico; (4) *Q. incana* subsp. *yucatanensis* (Lundell) Iltis, a new combination, centered on the Yucatán Peninsula, Mexico; (5) *Q. lindeniana* Cornejo & Iltis, a new species from Quintana Roo, Mexico and endemic to the Yucatán Peninsula; (6) *Q. morenoi* Cornejo & Iltis, a new species described from Nicaragua where it is common, but distributed from southwestern Mexico to northern Costa Rica; and (7) *Q. morenoi* forma *hastata* Iltis, a juvenile form. Within the Capparaceae, the genus *Quadrella* now includes 25 species, 9 subspecies and a variety known from across Mesoamerica and the West Indies.

KEY WORDS: *Quadrella*, Capparaceae, Mesoamerica, West Indies, IUCN Red List

RESUMEN

Se establecen seis nuevas taxa y una nueva combinación perteneciente al género *Quadrella* (DC.) J. Presl (Capparaceae s.s.), distribuidas en la República Dominicana y América Central. (1) *Quadrella alaineana* Cornejo & Iltis, una rara especie endémica de Azua, en la República Dominicana; (2) *Quadrella dressleri* Cornejo & Iltis, un segundo taxón detritófilo del este de Panamá; (3) *Quadrella incana* var. *triangularis* Cornejo & Iltis, una nueva variedad endémica de la costa de Jalisco, Méjico; (4) *Quadrella incana* subsp. *yucatanensis* (Lundell) Iltis, una nueva combinación, esta subespecie se encuentra centrada en la Península de Yucatán, Méjico; (5) *Q. lindeniana* Cornejo & Iltis, una nueva especie endémica de Quintana Roo, en la Península de Yucatán, Méjico; (6) *Q. morenoi* Cornejo & Iltis, una nueva especie descrita para Nicaragua donde es común, y distribuida desde el suroccidente de Méjico hasta el norte de Costa Rica; (7) *Q. morenoi* forma *hastata* Iltis, una forma juvenil. En Capparaceae s.s., el género *Quadrella* ahora está constituido por 25 especies, 9 subespecies y una variedad, distribuidas a lo largo de Mesoamérica y las Indias Occidentales.

Quadrella (DC.) J. Presl (Capparaceae s.s.), is an American genus that now comprises 25 species, 9 subspecies and 1 variety. It is centered on the lands surrounding the Caribbean Sea, from western Mexico to Panama and from Florida and the Bahamas through the West Indies to northern Colombia and Venezuela (Iltis & Cornejo 2010 a, b). The six new taxa we discovered during our revision of *Quadrella* for a treatment of Capparaceae for Flora Mesoamericana (in prep.); are described as follows.

1. *Quadrella alaineana* Cornejo & Iltis, sp. nov. (**Fig. 1**). TYPE: DOMINICAN REPUBLIC [Hispaniola]. AZUA: Monte Río Azua, sandy soil, in thickets, 22 Aug 1964 (fl), *Bro. Basilio Augusto Lavastre 1730* (HOLOTYPE: JBSD; ISOTYPES: NY, WIS).

Species *Quadrella domingensis* (Spreng. ex DC.) Iltis & Cornejo et *Q. ferrugineae* (L.) Iltis & Cornejo affinis, a qua differt sepalis grandior, 5–7 × 1.5–2.5 mm (vs. 1–5 [–6] × 0.5–1 mm), oblongis et valvatis; gynophoris longioribus, 6–9 mm longus (vs. 1–5 mm).

Shrubs ca. 2 m tall, slender and much branched, evergreen, pubescent throughout, with dense, short, delicately branched candelabra trichomes with yellowish brown centers and whitish arms. Leaves alternate to spirally arranged; petioles 0.6–1.5 cm, canaliculate; blades conduplicate when young, at maturity ovate to elliptic or slightly obovate, 3.4–8 × 1.3–3.7 cm, thinly coriaceous or chartaceous, dull, green to brownish, densely white-stellate and glabrescent, leaving adaxially abundant, microscopic dark to light dots, light green or brown abaxially, with abundant short candelabra trichomes not soft to the touch; apex acute to obtuse or rounded and minutely apiculate, sometimes emarginate, the base rounded, truncate to inconspicuously retuse; lateral veins 7 to 10 pairs, upwardly arching, the tertiary veins laxly reticulate, both prominent



FIG. 1. *Quadrella alaineana*: A. Flowering branches. B. Flower bud with sepals obscuring the petaled bud until just before anthesis. C. Flower in post-anthesis. A–C: Holotype, Bro. B. Lavastre 1730, JBSD. The map (upper right) indicates the location of Azua Province on Hispaniola in the Dominican Republic, wherein exist the only known stations.

abaxially. Inflorescences at terminal branchlets, openly corymbose-racemose, encrusted with short candelabra trichomes; peduncles \pm complanate, 2–6(–7.5) cm, bearing 2 to 5 flowers, with only one open at a time; floral bracts linear, 2–3 mm, soon deciduous; pedicels 1.5–2.7 cm, densely candelabroid pubescent. Sepals 1-seriate, covering the petals in bud nearly to anthesis, oblong, 5–7 \times 1.5–2.5 mm, widely spreading to sharply reflexed at anthesis, densely encrusted with short brownish candelabra trichomes adaxially and abaxially, each sepal subtending a basally pubescent gland, 0.3–1 \times 1.2–2 mm; petals ovate, 7–8.5 \times 4–5 mm, white, costate and densely pubescent abaxially, veined and glabrous adaxially; stamens 8, the filaments ca. 8 mm, stellate or candelabroid pubescent at base, the anthers ca. 2 mm; androgynophores ca. 0.8 mm, glabrous; gynophores 6–9 mm, the ovaries oblong-ellipsoid, ca. 3 \times 1 mm, both densely covered by short, whitish candelabra trichomes, the stigma truncate. Fruits unknown.

The rare *Quadrella alaineana*, with all four collections gathered at presumably the same general locale in Azua province over a period of some 51 years, has had a confused taxonomic history. Recognized as rare and distinct from the softly and densely pubescent *Q. grisebachii* (= *Q. domingensis* subsp. *grisebachii* [Eichler] Iltis) on the basis of the two (mixed) *Rose et al.* paratypes in NY by that great student of the Hispaniola flora, Bro. Alain (E.E. Lioger), who, in a long letter to Iltis of Jan. 16, 1968, made it quite clear that he believed these NY *Q. alaineana* specimens to represent *Q. domingensis* (and which Alain then thus so annotated in NY) and that the *Q. grisebachii* specimens were a totally different species. Unfortunately, Bro. Alain never saw Bertero's type for *Q. domingensis* from Azua, Hispaniola (of which WIS has a single leaf and a photocopy of the type ex M), which would have suggested that: 1) *Q. grisebachii* was a synonym, or at best a subspecies, of *Q. domingensis* (cf. Rankin & Greuter 2004: 263; Iltis & Cornejo 2007); and 2), that the two *Rose et al.* paratypes (3903 and 4405) were indeed a very different and undescribed endemic taxon from Azua. This is one of the most arid localities in the Dominican Republic, and a biodiversity hot spot of local endemism, to which we now add still another species.

Although the fruits and seeds of *Quadrella alaineana* are unknown, the presence of candelabra trichomes and flowers with eight stamens indicate that this species belong to *Quadrella* subg. *Intutis* (Rafinesque) Iltis (Iltis & Cornejo 2010b).

IUCN.—Due to the lack of recent collections of *Quadrella alaineana* and deforestation in Azua, this species is categorized as endangered, EN B2ab(iii).

Etymology.—In the afore-mentioned letter to the second author, Brother Alain outlined his future plans to recollect his "*Q. domingensis*," which he says "...seems to be restricted to the very dry Azua region..." a plan, which he never was able to fulfill. It is a pleasure, therefore, to name this new species in honor of that great lover of Hispaniola's flora, who had the acuity to realize that this Azua population was different and unique.

PARATYPES: DOMINICAN REPUBLIC. *Azua*: 14 Mar 1913, J. Rose, W. Fitch & P. Russell 3903, p.p. (B [not seen], NY, US, US fragm. at WIS); Mar 1913, J.J. Rose, W. Fitch & P. Russell 4405 (NY, US); Las Charcas, s.d., J. Jiménez s.n. (NY, USD [not seen]).

2. *Quadrella dressleri* Cornejo & Iltis, sp. nov. (Figs. 2–3). *TYPE*: PANAMA. PANAMA: 8–12 km N of El Llano along new El Llano-Cartí road, in premontane wet forest, 400–450 m, 12 Dec 1973 (fl), M. Nee, A. Gentry & R. Dressler 8765 (HOLOTYPE: WIS; ISOTYPES: MO, US, PMA, WIS [2]).

Species detritofila affinis *Quadrella antonensis* (Woodson) Iltis & Cornejo, a qua differt arbor parva plerumque monocaulis, foliis longioribus, (25–)30–70 \times 8–20 cm (vs. [12–]15–35[–40] \times 3–10[–11] cm), cum basis cordatis, inflorescentiis aphyllis disticho-ramosae paniculiformiis cum bracteis distichis persistentibus, subulatis, 3–4 mm longis, et ad 50 racemis subcorimbosis, solum 1 vel 2 interim, uterque cum 2 ad 8 floris, postquam brevi tempore decidua; petalis 7–8 mm longis.

Usually unbranched or sometimes 2-branched, slender treelets, 1 to 4 m tall, densely brown lepidote to stellate throughout. Crown leaves often very large, densely and tightly clustered, spirally arranged, upwardly pointing and basally overlapping into in a detritus-collecting funnel 50–130 cm across; petioles 0.8–2 cm, canaliculate, usually obscured by adventitious rootlets and half-decomposed leaf debris; leaf blades lepidote-stellate to stellate when young, broadly oblanceolate to oblong when mature, (25–)30–70 \times 8–20 cm, dark green and glabrescent, with hairs leaving abundant minute pinholes adaxially, light green with

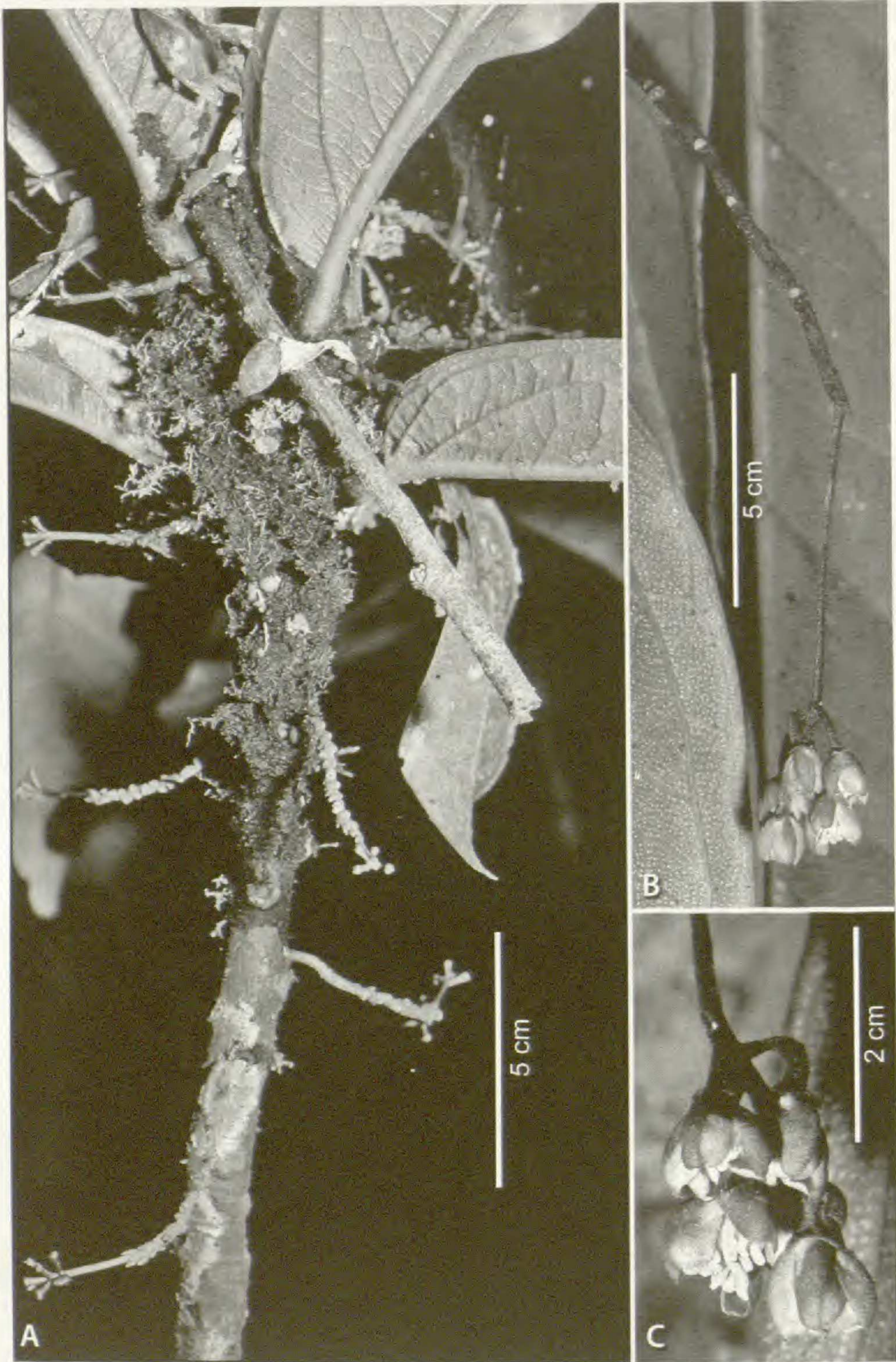


FIG. 2. *Quadrella dressleri*, a detritophilous, humilectic, Panamanian endemic. A. Dense, leafy crown of this single-stemmed treelet forms a "trash basket," wherein plant and animal detritus decomposes into humus soon invaded by adventitious, mycorrhizal roots from the stem. Panama: Colón, Santa Rita lumber road near Agua Clara. B. A 4- to 6-flowered, sub-umbellate-corymbose raceme, of which all flowers open at once. C. Close-up of the flowers nearly to anthesis. Panama: Panama, 12 km north of El Llano on Carti lumber road. Photos courtesy of Robert Dressler.

small white spots and lepidote abaxially, the apex abruptly acuminate to caudate-acuminate or gradually long-acuminate, the contracted tip (1-)2-7 cm, often ending in a hair-like extension of the midrib, the base narrowed to 4-8 cm, then rounded or truncate-retuse to subcordate or rarely cordate; lateral veins 9 to 15 (to 20), upward curved and strongly ascending. Inflorescences paniculiform, initially probably supra-axillary in, and projecting from, the leafy crown, but at maturity cauliflorous and projecting sideways to downward from the bare stem, structurally compounded of a slender, central, indeterminate, leafless racemiform

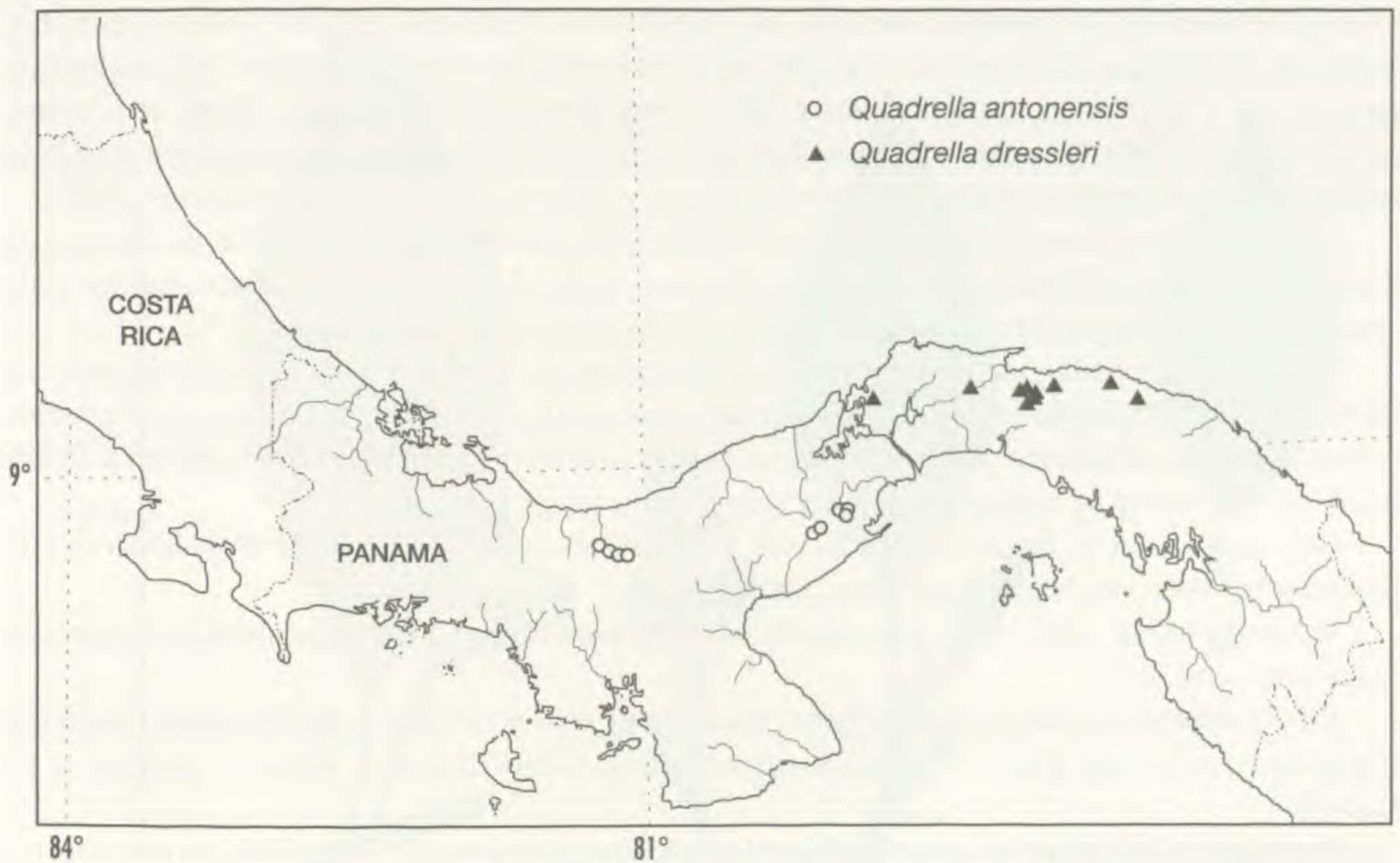


FIG. 3. Distribution map in Panama of *Quadrella dressleri* (solid triangles), mostly at low elevations north of the continental divide, and *Q. antonensis* (hollow circles), at mostly higher elevations near the top of the continental divide, showing their allopatric ranges separated by the Panama Canal.

branch, that is basally unbranched, bractless, sterile and terete for 1–20 cm, distally and laterally bears up to ca. 50 distichous, subulate, somewhat complanate and upward-curved persistent bracts, 3–4 mm long and mostly arranged 4–6(–15) mm apart, with each bract subtending a densely brown lepidote subumbelate raceme, 2–5(–8) cm, on pedicels (0.5–)0.7–1.3 cm, and 2 to 8 flowers near the tip, all of them opening at once; flower buds spherical, 4–6 mm diam. Up to 50 racemes are produced sequentially, alternately left and right, and, if not fertilized and developing into fruit, are soon deciduous. Sepals 1-seriate, triangular, 1 × 1.5 mm, ascending, light brown lepidote abaxially; petals ovate, 6–8 × ca. 3–5 mm, dirty white to cream or light-yellow, somewhat cucullate and strongly curved inward, divergent at anthesis (Stapf, pers. comm.), brown lepidote abaxially, glandular adaxially; stamens ca. 16 to 20, the filaments clavate, (4–)7–8 mm, glabrous to lightly stellate at base, the anthers ca. 1–1.2 mm, basifixed; gynophores absent, or at most only 1–3 mm, the ovaries ca. 1–3 mm, densely lepidote-stellate. Infructescences with pedicels 0.7–1.6 cm, the gynophores suppressed, the fruit pendulous, linear, 10–35 × 0.8–1.1 cm, strongly constricted between the (4 to) 12 to 17 seeds, tapering at both ends, densely brown or brownish green lepidote without, bright-orange within, at maturity dehiscent, splitting lengthwise along one suture, the seeds dangling from slender funicles, oblong, purplish or black, ca. 13–14 × 5 mm, immersed in an orange endocarp and surrounded by a bright orange aril; embryo green.

In its detritophilous habit, with the leaves densely arranged in pseudovercils at the end of the branches collecting humus, the main stem with adventitious roots, and the flowers without androgynophores, *Quadrella dressleri* resembles *Q. antonensis*, the more common and similarly detritophilous allopatric species in Panama. However, *Quadrella dressleri* differs from the latter by the larger leaf blades, (25–)30–70 × 8–20 cm (vs. [12–]15–35[–40] × 3–10[–11] cm), and by its paniculiform inflorescences, bearing to 2nd order bracteate determinate, soon deciduous few-flowered racemes (vs. inflorescences racemose, multi-flowered, elongated, indeterminate), the persistent bracts of the inflorescences (Fig. 2A, vs. bracts soon deciduous); and the longer filaments, 7–8 mm (vs. 4–5 mm). In addition, a very different floral behavior has also been

observed between the two species in the field. In *Quadrella dressleri*, the relatively few flowers of each short raceme are blooming at the same time (Fig. 2 B), but *Q. antonensis* has acropetal racemes, each sequentially opening only 1 to 3 flowers at a time of some 100 or more flowers per inflorescence (Stapf, pers. comm.; see also Sánchez 2001). On account of the stellate pubescence, and the long fruits bearing seeds with green embryos, this new species is placed in *Quadrella* subg. *Breyniastrum* (DC.) Iltis (Iltis & Cornejo 2010b).

Habitat and Distribution.—*Quadrella dressleri* is restricted to wet or very wet, tropical rain or submontane cloud forests of the Caribbean slopes of eastern Panama, north of the continental divide and east of the Panama Canal, in the provinces of Colon, San Blas and Panama, at 50–500(–850) m.

Phenology.—Flowering and fruiting apparently throughout the year, but on the basis of collections here examined, *Quadrella dressleri* seems to flower mostly between March and November, and is in fruit more so from September to January (April). The diurnal flowers have a very slight fragrance; between ca. 9:00 to 10:00, they are visited by beetles of Chrysomelidae Latreille (Stapf, pers. comm.).

Germination.—In its natural habitat as well as in laboratory testing, the seeds of *Quadrella dressleri* germinate between 3 to 4 days (Stapf, pers. comm.).

Vernacular names.—PANAMA. Basurera (Spanish, for trash basket), a name also used for *Q. antonensis* (Stapf, pers. comm.).

IUCN.—Due to the detritophyllous habit, *Quadrella dressleri* is not able to live in optimal conditions or even survive in open places after deforestation (Sánchez 2001). This new species is assigned to EN Blab(iii).

Etymology.—The species is named for Robert Dressler, the great neotropical Orchidologist and expert on Panamanian Flora, who first noticed the distinctive characters of this remarkable species (Dressler 1985).

PARATYPES: **PANAMA. Colon:** Santa Rita lumber road, near Agua Clara rain gauge, 13 Apr 1980, R. Dressler s.n. (WIS [3]); Santa Rita Ridge Trail, S. Mori & M. Crosby 6337 (MO). **Comarca de San Blas:** Cerro Brewster, G. de Nevers, A. Henderson, H. Herrera, G. McPherson & L. Brako 6267 (MO); between Río Nergala Río Cangandí, G. de Nevers & H. Herrera 4564 (MO); Cangandí, hills NW of village toward Río Nergala, G. de Nevers, H. Herrera & S. Charnley 6528 (MO); quebrada affluente de Río Diable, Cordillera frente a Isla Narganá, C. Galdames, E. Montenegro, C. Chung, H. Herrera 1558 (PMA, SCZ); Cerro Habú, K. Sytsma, T. Antonio, R. Dressler 2658 (MO); trail to Cerro Obu [Habú], G. de Nevers, H. Herrera & E. Gernado 7970 (MO). **Panama:** El Llano-Cartí rd., 10 km from Inter-Amer. hwy, S. Mori & J. Kallunki 2318 (MO, PMA, WIS); El Llano-Cartí rd., 10–12 km from jct. w. Inter-Amer. hwy, S. Mori & J. Kallunki 2855 (WIS); ca. 12 km N of El Llano, El Llano-Cartí rd., R. Dressler 5920 (WIS [2]); ca. 13 km N from Pan-Amer. hwy, B. Hansen & S. Mori 2996 (WIS [2, wood at USDA, MAD]); Kuna Yala, Nusagandí, sede de campo de PEMASKY, R. Paredes, R. Foster, R. Pérez, S. Aguilar, Z. Batista, R. Mihalik, A. Salywon 899 (F, PMA, SCZ); Gorgas Memorial Labs, Camp. Quatro, 5–10 km NE of Altos de Pacora, S. Mori & J. Kallunki 3409 (MO, US).

3a. *Quadrella incana* (Kunth) Iltis & Cornejo subsp. *incana*, Novon 17:452. 2007. (Figs. 4 A–D, 5 A, B, E, F, J–L, 9 lower map). BASIONYM: *Capparis incana* Kunth, Nov. Gen. & Sp. Pl. 5:94. 1821. *Octanema incana* (Kunth) Rafinesque, Sylva Tellur. 108. 1838. TYPE: MEXICO, GUERRERO: "Crescit in declivitate occidentali montium Mexicanorum, inter Mescala et Estola," 300 m, Apr, A. Humboldt & A. Bonpland s.n. (lectotype P, designated by Iltis & Cornejo (2007); ISOTYPE: B–W 10,045, B–W photo 9479 at WIS).

Capparis pauciflora C. Presl [nom. illeg., non *Capparis pauciflora* Kunth (1821)], Rel. Haenk. 2:86. 1835. TYPE: MEXICO, GUERRERO?: "In terris occidentalibus Mexici," T. Haenke s.n. (HOLOTYPE: PR; ISOTYPES: LE, MO).

Capparis karwinskiana Schlechtendal, Linnaea 10:237. 1836. TYPE: MEXICO: San Bartolo, 1830, W.F. Karwinski s.n. (HOLOTYPE: M; ISOTYPE: BR, BR photo at WIS).

For a complete description of this species see Iltis & Cornejo (2007: 452).

Habitat and Distribution.—In dry woodlands, from southwestern to eastern Mexico, where very common, rarely into southeastern Texas, east to Guatemala and rarely into Honduras (Iltis & Cornejo 2007: 453).

3b. *Quadrella incana* var. *triangularis* Cornejo & Iltis, var. nov. (Figs. 5 C, D, 9 lower map). TYPE: MEXICO, JALISCO: thorn scrub on inner beach of Bungalow Major Beach, ca. 8 km NW of Chamela, 19°33'N 105°08'W, 2 m, 22 Jun 1984, H.H. Iltis & S. Wisniewski 29194 (HOLOTYPE: WIS [fl]; ISOTYPE: MEXU [st]).

A subspecies *incanae*, sepalis triangularis, 1–1.5 mm longis, 1–1.3 mm latis et filamentis minoribus ca. 4 mm longis (vs. 6–9 mm), differt.

Sepals triangular, flat, minute, 1–1.5 × 1–1.3 mm (Fig. 5 C–D), ascendent at anthesis, each subtending a

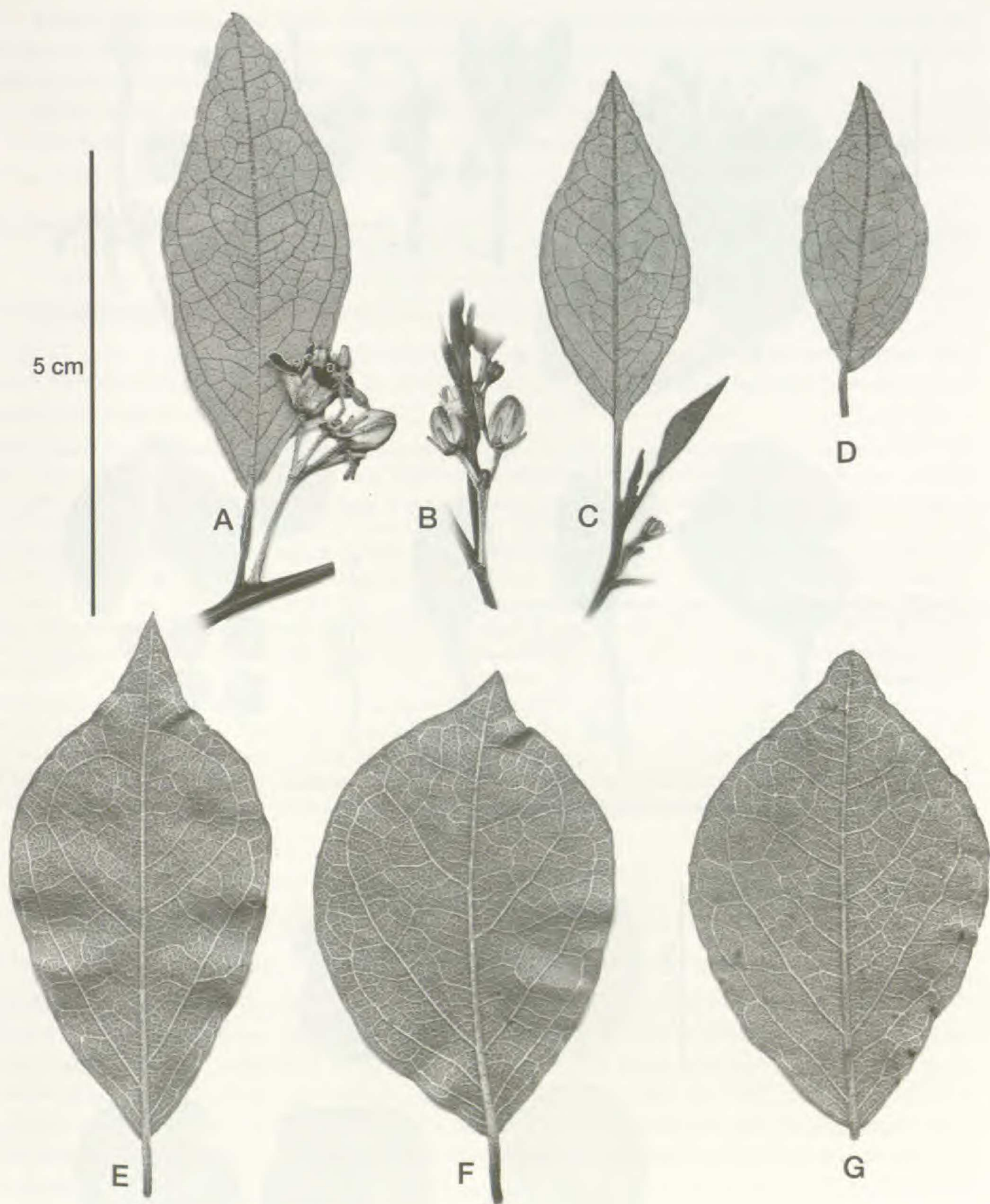


Fig. 4. *Quadrella incana*: A–D. Leaves and inflorescences of subsp. *incana*, with few, upward-arching, interconnecting veins, and flowers with linear sepals and short peduncles. E–G. *Quadrella incana* subsp. *yucatanensis*, the obovate-leaved subspecies, native mostly to the Yucatan Peninsula. A–D, from Martínez 20248, MEXU. E–G, from the LL-TEX ISOTYPE: Lundell & Lundell 7452.

1–1.5 mm gland, which persists in fruit; petals 4–7 × 3–4 mm, white but rusty ferruginous and tomentose stellate abaxially, apparently glabrous adaxially; stamens with filaments ca. 4 mm, densely white stellate on basal half to entire length; gynophores 4–5.5 mm, the ovaries ellipsoid, 2 mm. Infructescences with gynophores 5–7 mm, the fruits 8–20 × 6–10 mm, reddish green without.

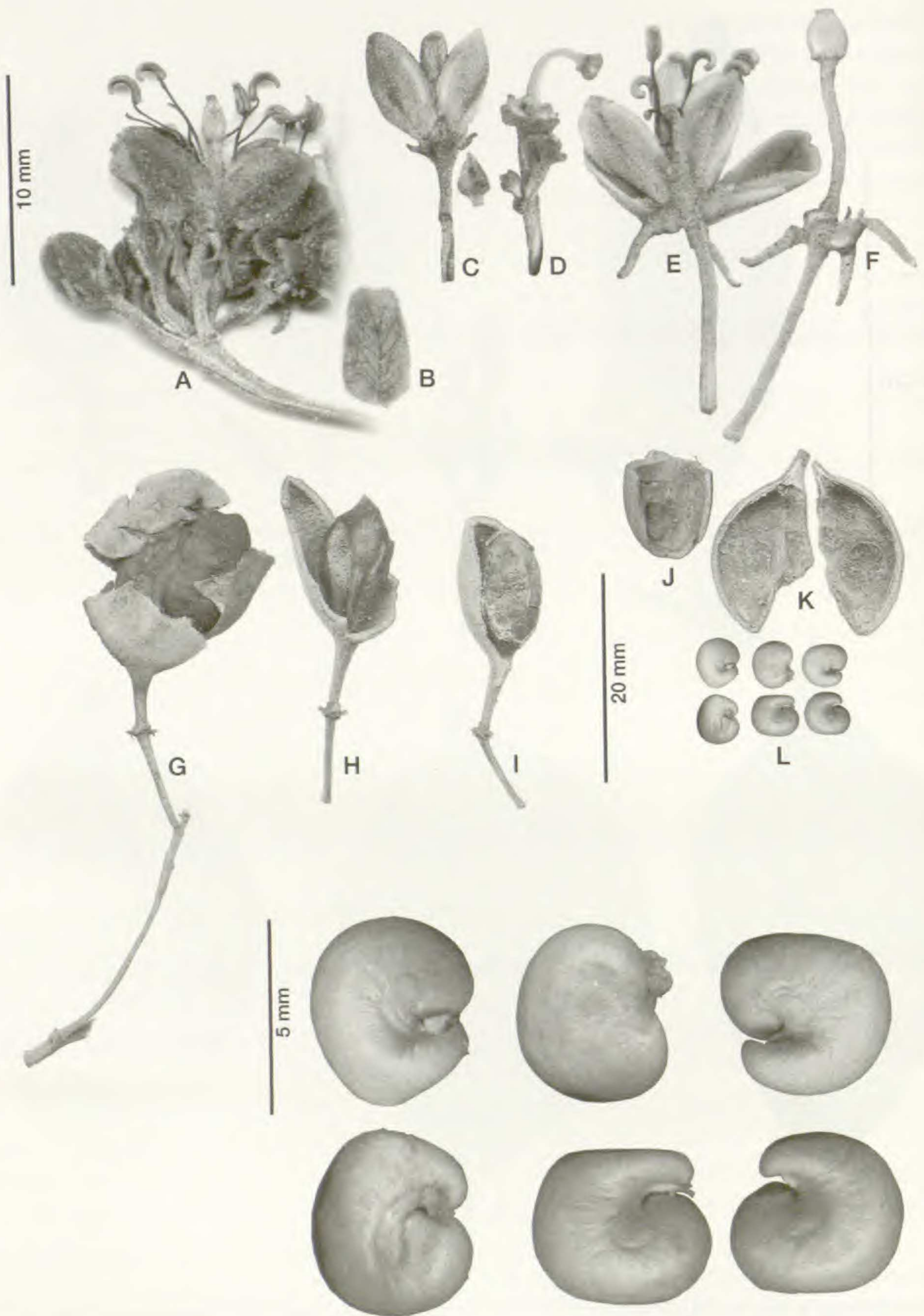


FIG. 5. A, B, E, F, J, K, L: *Quadrella incana* subsp. *incana*. A. Clustered, subcorymbose inflorescence, with linear sepals, one open flower with eight stamens. B. One petal of A, showing pinnate nervature. E. Dried linear, \pm contorted, reflexed sepals. F. Flower at postanthesis. J, K: \pm thick fruit coats. L. Three cochleate-reniform cleomoid seeds (each pictured from both sides after removal of soft red aril), with firm, hard brittle testa and a "cleomoid" cochleate-reniform white embryo within, the same six seeds enlarged below. C-D. *Quadrella incana* var. *triangularis*. C. Flower with broadly triangular sepals. D. Flower at postanthesis. G-I. *Quadrella morenoi*. G. Showing large, solitary, straight, green capparoid embryos, enclosed by a thin, fragile testa (I) enclosed by a \pm thickened fruitcoat. A, B: Moreno & Robleto 22899 (WIS). C, D: Iltis & Wisniewski 29194 (from the holotype, WIS). E, F: Johnson 4370 (WIS). G: Espinosa 462 (WIS). H-I: King 239 (WIS). J, L: Quero 2983 (WIS). K: Pringle 7291 (WIS).

Except for its variable leaf shape, *Quadrella incana* is a rather uniform species in its flowers and fruits. All but two (from westernmost Jalisco) of the 350 specimens studied for the species have the characteristic filiform (when dry) or linear, densely stellate sepals, and stamens with filaments 6–9 mm.

IUCN.—There is not sufficient information of this subspecies, DD.

Etymology.—The infraspecific epithet refers to the triangular sepals, which characterize this variety.

PARATYPE: **MEXICO. Jalisco:** Chamela, entrada a la Salinas, 22 Aug 1980, L. Pérez 1931 (IBUG, MEXU).

3c. *Quadrella incana* subsp. *yucatanensis* (Lundell) Iltis, comb. et stat. nov. (**Fig. 4 E–G**). **BASIONYM:** *Capparis yucatanensis* Lundell, Bull. Torrey Bot. Club 69:389. 1942. **TYPE:** MEXICO [Yucatan]: Chichen Itzá, off Kaua road, 8 Jun 1938 (fr), C. Lundell & A. Lundell 7452 (**HOLOTYPE:** MICH; **ISOTYPES:** DS, F [not seen], GH, LL-TEX [2], NY, US).

A Quadrella incana subsp. *incana* affinis a qua differt lamina obovata vel rombica.

Quadrella incana subsp. *yucatanensis* is characterized by its broadly obovate to rhomboid leaves, most commonly represented in specimens from the Yucatan Peninsula, but scattered beyond, here and there, throughout much of the range of *Q. incana*.

Selected specimens: **MEXICO. Campeche:** Mun. Campeche, ciudad de Campeche, C. Gutiérrez 6824 (MEXU); región de Calakmul, Mun. Holpechén, E. Martínez, D. Alvarez & S. Ramírez 30888 (MEXU). **Quintana Roo:** Puerto Morelos, Playa Ojo de Agua, P. Moreno 616 (MO). W of Puerto Morelos, G. Davidse, M. Sousa, A. Chater & E. Cabrera 20043 (MEXU). Isla Mujeres, Playa Lancheros, E. Cabrera & H. de Cabrera 13090, 15425 (MEXU). Isla de Cozumel, E. Cabrera, O. Téllez & H. de Cabrera 11147 (MEXU, MO); 35 km S de San Miguel de Cozumel, E. Cabrera & H. de Cabrera 8710 (MEXU, NY). **Yucatan:** Mun. Progreso, 1 km W de Chuburna Puerto, M. Pérez 466 (MEXU), F. Kú & Yam 455 (MEXU); Progreso, Román s.n. (F); E of Progreso, A. Bradburn 1085 (WIS); ca. 1 mi W of Chicxulub Puerto, G. Webster, S. Lynch & G. Breckon 17566 (DAV); 10 km E de Chicxulub Puerto, E. Cabrera & H. de Cabrera 8809 (K, MEXU, MO, NY); Mun. Telchac Puerto, F. Kú & Yam 245 (MEXU); 5 km E de Telchac Puerto, E. Reyes 323 (MEXU); 10 km E de Telchac Puerto, E. Cabrera & H. de Cabrera 10742 (MEXU); 15 km O de Telchac Puerto, E. Cabrera & H. de Cabrera 11313 (TEX, MEXU); Dzilam de Bravo, J. Tun 210 (MEXU); 4–6 km O de Las Coloradas, E. Cabrera & H. de Cabrera 15741 (MEXU); sine loc., E. Alexander s.n. (NY). **Chiapas:** Mun. Ocozocoautla, Reserva del Ocote, J. Calzada, P. & B. Gómez 10062 (MEXU). Mun. Chicoasén, 500 m al S de Chicoasén, A. Reyes-García 544 (BM, MEXU). **Oaxaca:** Distr. Tehuantepec, El Salado, R. Cedillo & R. Torres 1081 (CAS, MEXU); subida al cerro Guiengola por el camino que va a Las Palmitas, M. Torres et al. 896 (MEXU, MO); 1 km N de las ruinas del cerro Guiengola, M. Torres et al. 812 (MEXU, MO). **Jalisco:** Chamela, Las Salinas, C. León 84 (MEXU); Mun. La Huerta, entrada a las Alamandas, E. Lott 1717 (CAS, MO). **Colima:** 1 km NW de Tamala (Aquiles Serdán), R. Cuevas & L. Guzmán 4927 (WIS [2], ZEA). **HONDURAS. Comayagua:** 16.6 mi S of Siguatepeque, J. Walker 423 (DUKE, F, GH, US).

4. *Quadrella lindeniana* Cornejo & Iltis, sp. nov. (**Figs. 6, 7**). **TYPE:** MEXICO. QUINTANA ROO: Isla de Cozumel, a 1 km NO del Faro de la Punta Celarain, 4 Jun 1986 (fl), E. Cabrera & H. de Cabrera 11433 (**HOLOTYPE:** MEXU [MEXU photocopies at AAU, B, BM, COL, DAV, F, GH, GUAY, K, MA, NY, P, QCA, QCNE, S, U, UC, US, WIS]; **ISOTYPES:** MO, TEX).

Species affinis *Quadrella indicae* (L.) Iltis & Cornejo, a qua differt inflorescentia pauciflora, cum floris minoribus et fructus angustibus. Shrub to small trees, to 8 m tall, rusty or brown lepidote-peltate throughout. Leaves spirally arranged; petioles 2–8 mm, canaliculate; blades conduplicate and densely stellate when young, at maturity oblanceolate to narrowly elliptic, 3–9 (–11) × 0.8–2.5 cm, dull to shiny and glabrescent adaxially, densely peltate-lepidote abaxially, the base cuneate, the apex acute to acuminate, usually apiculate, sometimes obtuse or rounded, rarely emarginate; lateral veins (6 to) 7 to 12 pairs. Inflorescences umbellate or corymbose, 1 to 4 from axils of uppermost branch leaves, the peduncle ± flattened, 1.5–5 cm, bearing (1 to) 4 to 10 clustered flowers at the tip; floral bracts linear to narrowly triangular, ca. 2.5 mm, soon deciduous; pedicels 0.6–1.5 cm, flattened; flowers white or cream with sweet odor. Sepals 1-seriate, narrowly triangular to triangular, 1.5–2.4 × 1–2 mm, usually ascending, at anthesis barely covering the base of the petals, densely lepidote abaxially, appressed pilose adaxially, each subtending a triangular, acute, erect, scale-like flattened (when dry) gland, the gland 1–2 mm, lepidote to lepidote-stellate abaxially, glabrous adaxially; petals suborbicular to obovate, 5–7 × 4–5 mm, densely stellate tomentose, except for a thin longitudinal row of lepidote-stellate trichomes on midrib abaxially; stamens ca. 15 to 30, the filaments 7–10 mm, lepidote to stellate at the base, the anthers 1.5–2 mm; androgynophores ca. 1 mm; gynophores 2–7 mm, the ovaries 2–3 × ca. 1 mm, both densely golden lepidote, the stigmas capitate to truncate, sessile, drying dark brown. Infructescences with

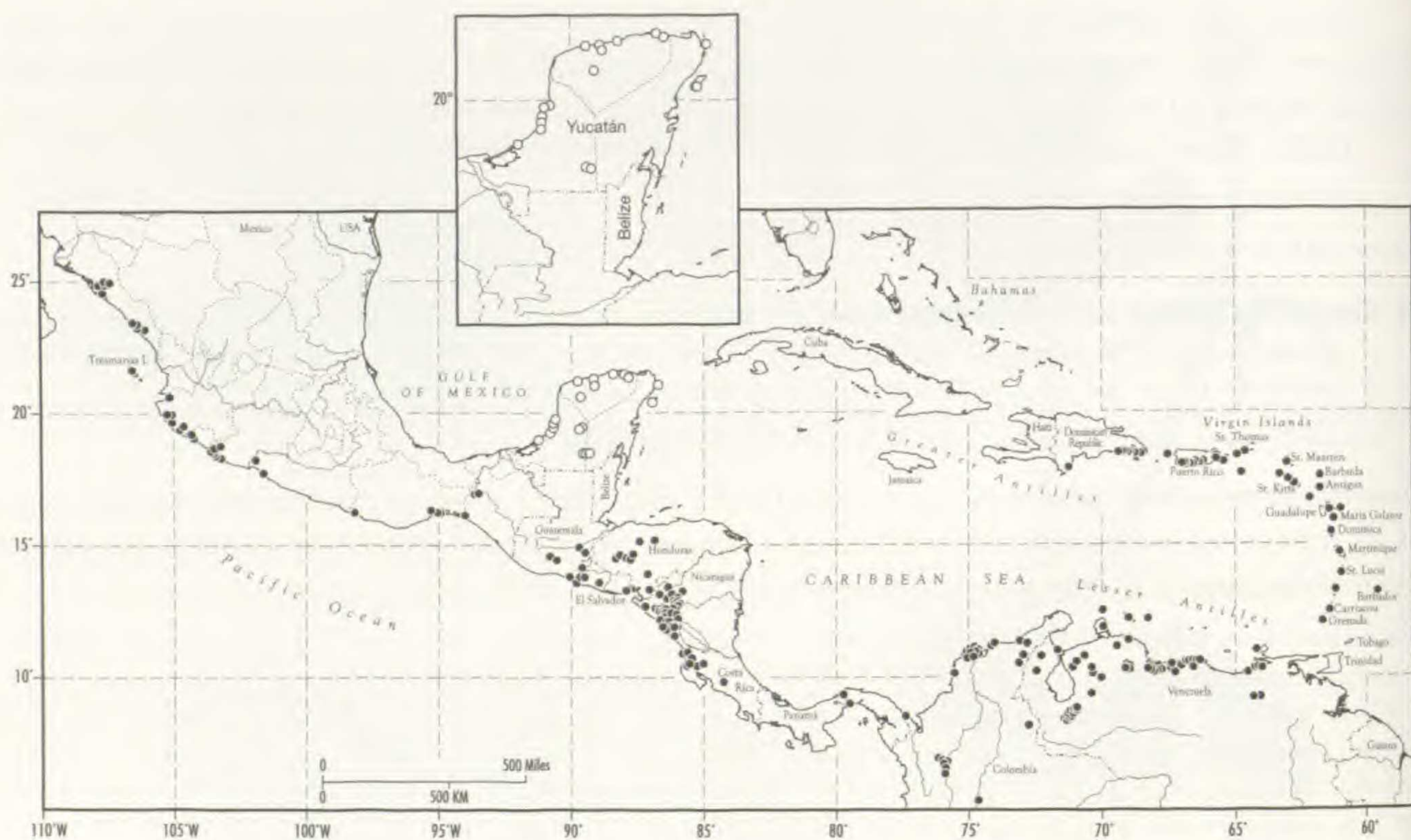


FIG. 6. Distribution map of *Q. lindeniana* (hollow circles) and *Quadrella indica* (solid circles), showing their allopatric ranges.

peduncles 1.5–5 cm, the pedicels 1–2.5 cm, the gynophores 3–9 mm, lepidote to glabrate, the fruits slender, \pm torulose, $1.5\text{--}12 \times 0.4\text{--}0.7$ cm, cream, yellow or orange to brown, densely lepidote without, at maturity splitting lengthwise along one suture, exserting the orange-arillate seeds on the bright orange pulpy endocarp of their valves; seeds cochleate-reniform, $5\text{--}8 \times 4\text{--}5$ mm.

Quadrella lindeniana is vegetatively very similar to the allopatric *Q. indica*, but differs by having distinctly smaller flowers (Fig. 7 B, C), with petals only $5\text{--}7 \times 4\text{--}5$ mm (vs. $8\text{--}14 \times 6\text{--}8$ mm), filaments only 7–10 mm (vs. [15–]18–30 mm), gynophores only 2–7 mm (vs. [12–]17–40 mm) in flower, and 3–9 mm (vs. 12–45 mm) in fruit, ovaries 2–3 mm (vs. 3–5 mm) and fruits narrower, 4–7 mm (vs. [6–]7–12[–14] mm). In addition, the inflorescences of *Quadrella lindeniana* are truly corymbose or even umbellate, having fewer flowers ([1]4 to 10) than those of *Q. indica*, which has the inflorescences distinctively more racemose-umbellate to racemose-corymbose, bearing more flowers (8–14[–20]).

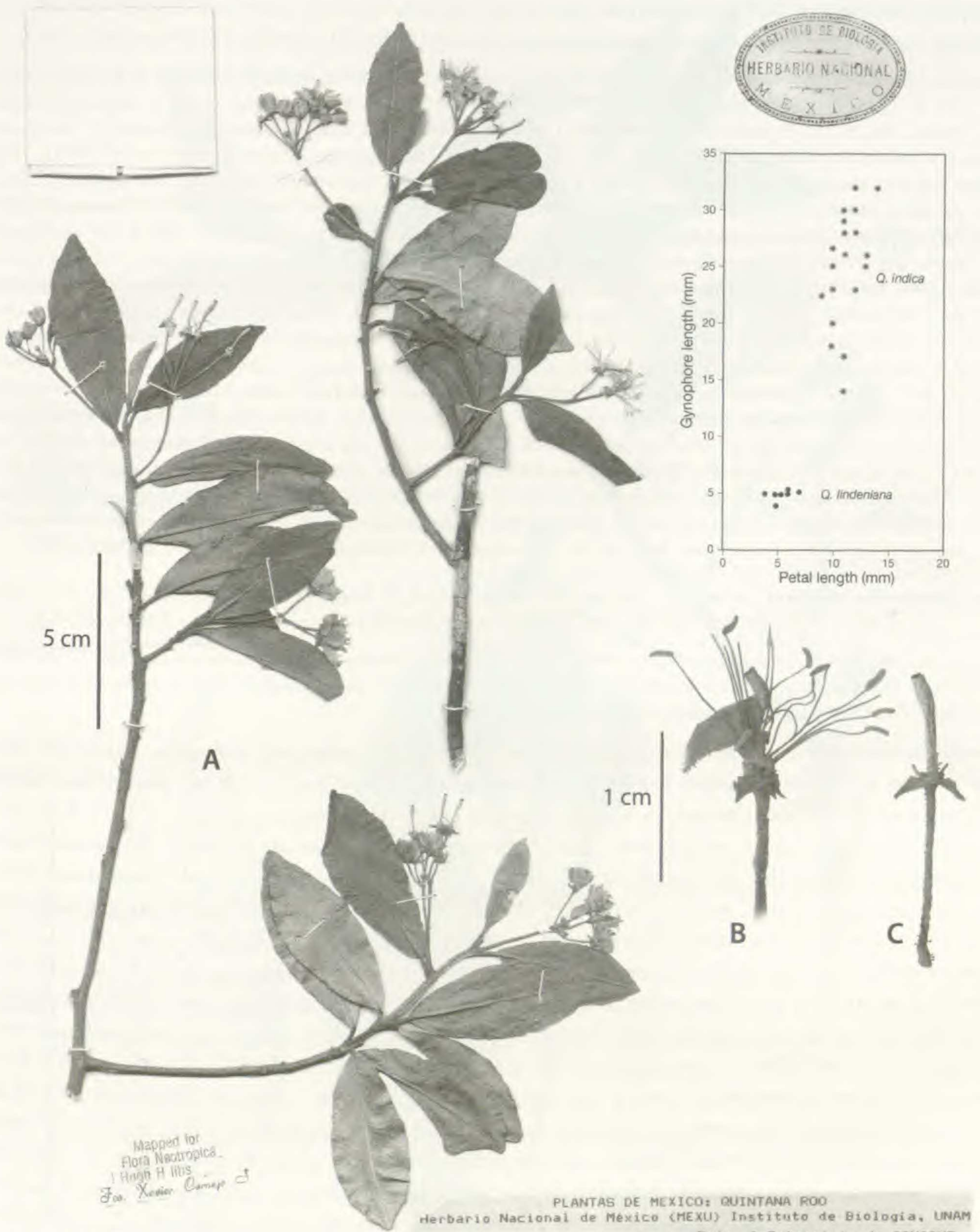
Habitat and Distribution.—*Quadrella lindeniana* is restricted to Mexico's Yucatan Peninsula, where it occurs from the landward mangrove fringes in the far north, through dry thorn scrub to subdeciduous lowlands and subevergreen forests in the south, often growing on coastal dunes or rocky soils, and persisting in disturbed forests. It is allopatric to the similar but widespread *Q. indica*, which ranges from the Mexican states of Sinaloa and Nayarit to Costa Rica, mostly in the dry Pacific coastal areas, and from the central West Indies to Colombia and Venezuela (Fig. 6).

Phenology.—Flowering from April to June, and fruiting from July into September.

Vernacular names.—MEXICO. Negrita (J.D. Shepherd 180), salvo (Zamora 4795).

IUCN.—Although *Quadrella lindeniana* is restricted to the Yucatan Peninsula, the many fertile collections suggest however, that there are still a reasonable number of healthy populations of this new species, thus *Q. lindeniana* deserves a lower priority, LC.

Etymology.—The earliest collections of *Quadrella lindeniana* were apparently made by a young Jean Jules Linden (1817–1898) from the “environs de Campeche,” when, in May of 1838, he collected the species in full bloom with the comment (from the French), that the flowers were white and fragrant. Labelled by hand simply as “*Capparis indica* Linden 999” in the Kew and Florence Webb herbaria (now included at FI), but as



Mapped for
Flora Neotropica
by Hugh H. Iltis
For Xavier Cornejo

HOLOTYPE of:

Quadrella lindeniana X. Cornejo & H.H. Iltis, sp. nov.

Det.: Xavier Cornejo (GUAY) & Hugh Iltis (WIS), 2005

Herbarium WIS, University of Wisconsin-Madison

PLANTAS DE MEXICO: QUINTANA ROO
Herbario Nacional de México (MEXU) Instituto de Biología, UNAM
Bajo el Patrocinio de CONACYT

Capparis cynophallophora L.

Loc. A 1 Km al NO del Faro de la Punta Celarain, Isla de Cozumel.

Arbol, 5 m, fl. blanca

Veg. Selva baja, con *Piscidia*, *Pithecellobium mandense*

Fecha: 04 Jun 1986

Col. Edgar Cabrera C., No. 11433, H. de Cabrera

FIG. 7. *Quadrella lindeniana*. A. Flowering branches. B. Small flower in anthesis, with three petals removed. C. Flower in post-anthesis. (A–C. Cabrera & de Cabrera 11433, MEXU holotype). Upper right: Scatter diagram of gynophore length vs. petal length, distinguishing *Q. lindeniana* from *Q. indica*.

Capparis lindeniana in the Paris herbarium, this nomen nudum, which we have here happily adopted, was written down in the same unknown handwriting as that on the locality label itself (Urban 1902–1903).

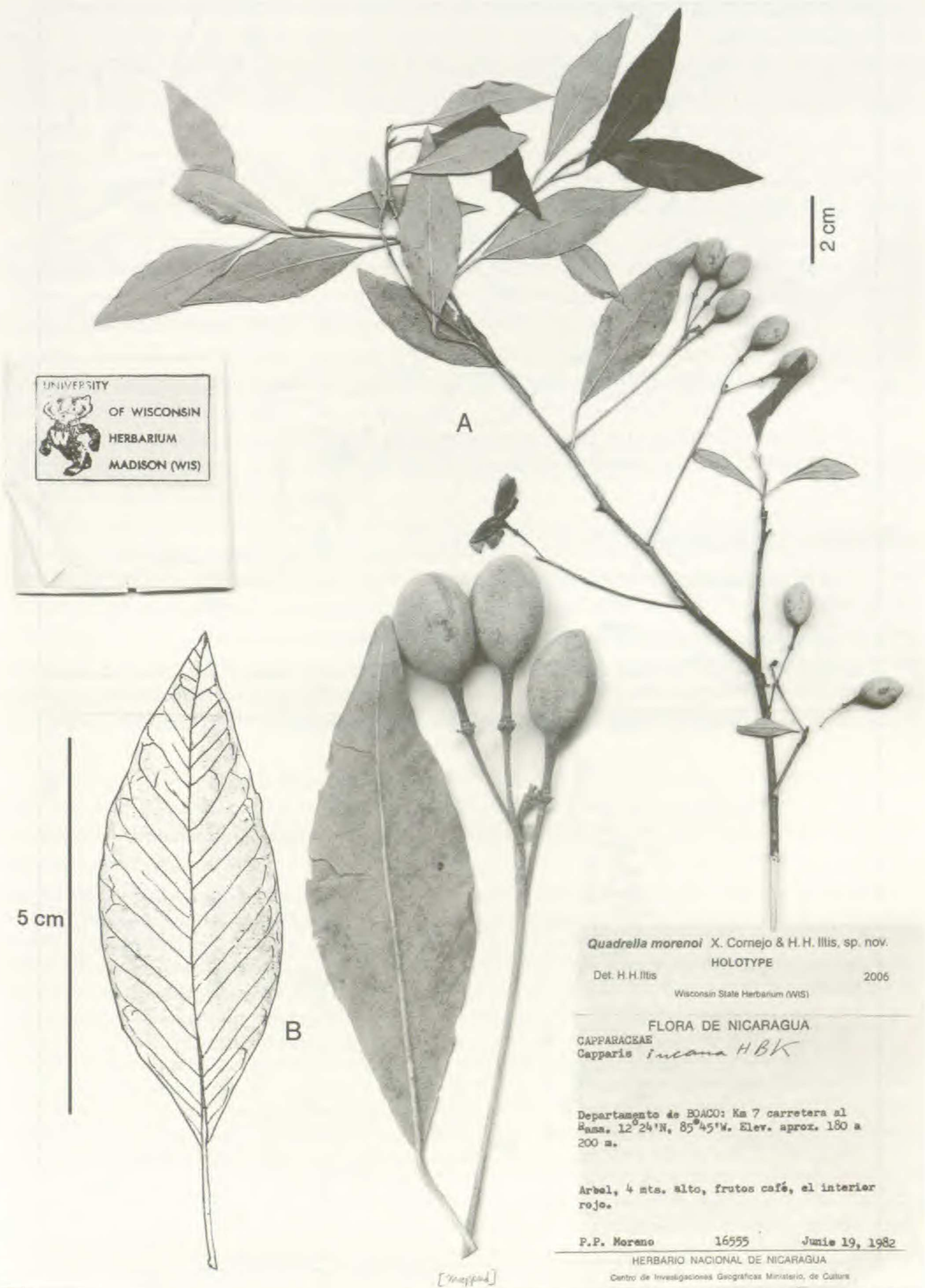
PARATYPES: **MEXICO. Campeche:** Mun. Campeche, Campeche, C. Gutiérrez 6825 (MEXU); Lerma bei Campeche, C. & E. Seler 4018 (A, B, F, GH, K, U); environs de Campeche, May 1836 (fl), M. [sic!] Linden 999 (FI, K, P). Mun. Calakmul, E. Lira, E. Madrid & E. Gamboa 870 (MEXU, TEX), E. Lira, E. Madrid & E. Gamboa 1190, 1203 (MEXU); 36 km S de la caseta de entrada a Calakmul, E. Martínez, D. Alvarez, S. Ramírez & G. Bacab 28302 (BM, MEXU, MO [not seen]); km 100 carr. Escárcega-Chetumal, E. Lira et al. 1271 (MEXU, TEX). Camp. Inst. Nac. Antropología e Historia de Calakmul, E. Martínez, D. Alvarez & S. Ramírez 27627 (BM, MEXU, MO [not seen]); 2 km O de Calakmul, E. Martínez, D. Alvarez, S. Ramírez 27640, 27681 (MEXU). Mun. de Champotón, camino a Calakmul, P. Zamora 4795 (TEX, UACAM); alrededores de la zona arqueológica de Calakmul, P. Alvaro 334 (MEXU); 3 km N de Champotón, sobre la carr. a Campeche, E. Cabrera et al. 2748 (MEXU). 6 km NE de Champotón, E. Cabrera, H. de Cabrera & O. Canul 8494 (MEXU, MO), E. Cabrera & H. de Cabrera 14446 (MEXU); 8 km N de Champotón, E. Cabrera & H. de Cabrera 11802 (MEXU, MO); 9 km N de Champotón, E. Cabrera & H. de Cabrera 14062 (MEXU, MO); 15 km al N de Champotón, E. Cabrera & H. de Cabrera 13388 (MEXU); 2 km S de Si-ho Playa, C. Chan 5118, 5385 (MEXU); Chincana, C. Gutiérrez 4437 (TEX, UACAM); near Xpujil, J.D. Shepherd 180 (WIS); Zona Arqueol. Becan, 2 km O de Xpujil, E. Cabrera & H. de Cabrera 6954 (MEXU, MO, NY); alrededores Zona Arqueol. Becan, E. Cabrera, H. de Cabrera & O. Canul 8403 (MEXU, MO); 33 km al SO de la desviación a Sabancuy, sobre la carr. Campeche-ciudad del Carmen, E. Cabrera & H. de Cabrera 11909 (CAS, MEXU, MO, WIS). **Yucatan:** Rubble mounds near Uitzina, S. Darwin, D. White & C. Trenary 2708 (WIS); Hda. Subin-Okal al SE de Hda. Ermita, O. Enriquez 696 (MEXU, US); Progreso, May 1933, R.S. Flores s.n. (F); Lake Chichankanab, G. F. Gaumer & sons 23679 (C, F, GH, K, MA, MO, NY, US); 13 km W of El Cuyo, H. Quero & R. Grether 2455 (BM, MEXU, MO); 6 km S de Telchak Puerto, E. Cabrera & H. de Cabrera 11683 (MEXU); Tizimín, antes de llegar al Cuyo, C. Chan 5161 (MEXU); Mun. Dzemul, 6 km N de Dzemul, S. Escalante 1026 (MEXU); Mun. Dzilam, I. Espejel 639 (MEXU). **Quintana Roo:** Isla de Cozumel, 1 km N del Faro de la Punta Sur, E. Cabrera & H. de Cabrera 8725 (MO, NY); Isla de mujeres, 500 m al N de Playa Lancheros, E. Cabrera & H. de Cabrera 14193 (CAS, MEXU, MO).

5a. *Quadrella morenoi* Cornejo & Iltis, sp. nov. (Figs. 5 G–I, 8, 9 upper map). TYPE: NICARAGUA. BOACO: km 7 carr. al Rama, 12°24'N 85°45'W, 180–200 m, 19 Jun 1982 (fr), P. Moreno 16555 (HOLOTYPE: WIS; ISOTYPES: HNMN, MO, VDB).

Species *Quadrella incanae* (Kunth) Iltis & Cornejo affinis, a qua differt semina plerumque solitaria, ovoidea ad elipsoidea vel obovoidea, longioribus, 8–15 mm longus (vs. 4.5–6 mm), testa membranacea et delicatula, embryo grandior, ortho et viridis; foliis cum venis lateralibus, 7 ad 16; pedunculis longioribus, (1–)2–8 cm longus.

Small shrubs to trees, to 8 m tall and 10 cm or more dbh, stellate pubescent throughout, with light grayish to rusty or whitish trichomes. Leaves spirally arranged; petioles 0.5–2.3(–3.5) cm; blades often hastate when young, at maturity narrowly to broadly elliptic or lanceolate to obovate or ovate, (2.5–)3–8.5(–10) × 1–4(–5) cm, grayish green and glabrate adaxially, whitish to grayish stellate abaxially, the base attenuate or cuneate to obtuse, the apex usually acute to long-acuminate, occasionally obtuse, rounded and retuse or apiculate; lateral veins 7 to 16 pairs (Fig. 8), these usually parallel from the base, arching upward only near the margin. Inflorescences axillary, one to several per branchlet, the peduncles slender, (1–)2–8 cm, whitish stellate, ending in a short, crowded, subumbellate to corymbiform raceme of 3 to 8 (to 12) flowers; floral bracts linear to linear-lanceolate, 2–2.5(–5) mm, densely stellate abaxially, soon caducous; pedicels (0.3–)0.7–1.9 cm. Sepals 1-seriate, linear to filiform, 2.5–5 mm, densely stellate, each subtending a triangular gland, 1 mm, densely canescent abaxially; petals minute, broadly elliptic to oblong, 4.5–6 × 2.2–3 mm, white to brown tomentose stellate and costate abaxially, sparsely stellate to glabrous, with pinnate nervature adaxially; stamens 8, the filaments 6–7 mm, stellate on basal half to sometimes almost entire length, the anthers 1.5–2.8 mm, yellow; androgynophores ca. 1 mm, glabrous; gynophores 3–6 mm, the ovaries ca. 2 mm long, ellipsoid, longitudinally faintly ribbed at anthesis, both densely whitish stellate. Infructescences with pedicels 0.3–1.8 cm, the gynophores 0.3–0.8 cm, the fruits broadly ellipsoid to obovoid, 13–25 × 8–11 mm, usually brown to reddish brown or red [often also yellow in Costa Rica], densely stellate tomentose without, red within, at maturity dehiscent, splitting open into 2 to 4, ± thin, recurved valves to expose the seed; seeds often solitary (sometimes two), narrowly ovoid to ellipsoid or obovoid, 8–15 × 6–9 mm, surrounded by an orange to red aril that separates with the seed cleanly from the valves, the testa thin and delicate, papery membranous, not invaginated into the dark green embryo, the embryo straight, oblongoid and somewhat flattened, has the thick cotyledons barely folded one into, and over, the other and around the pointed radicle.

Quadrella morenoi is remarkably distinct from the surprisingly but only superficially similar *Q. incana* (of *Quadrella* subg. *Intutis*) by its often solitary (sometimes 2), 2- to 3- times larger seed (Fig. 5 G–I), covered by



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MADISON (WIS)

A

2 cm

B

5 cm

Quadrella morenoi X. Cornejo & H. H. Iltis, sp. nov.
HOLOTYPE
Det. H. H. Iltis 2006
Wisconsin State Herbarium (WIS)

FLORA DE NICARAGUA
CAPPARACEAE
Capparis incana HBK

Departamento de BOACO: Km 7 carretera al
Rasa, 12°24'N, 85°45'W. Elev. aprox. 180 a
200 m.

Arbol, 4 mts. alto, frutos café, el interior
rojo.

P.P. Moreno 16555 Junio 19, 1982
HERBARIO NACIONAL DE NICARAGUA
Centro de Investigaciones Geográficas Ministerio de Cultura

[mapped]

FIG. 8. *Quadrella morenoi*: A. Fruiting branch. B. Close up of the uppermost infructescence of A, showing the distinctive, elongate peduncle bearing the ovoid, often single-seeded fruits. Note attached leaf and a re-drawing of its dense nervature at left (drawn from the WIS holotype, Moreno 16555).

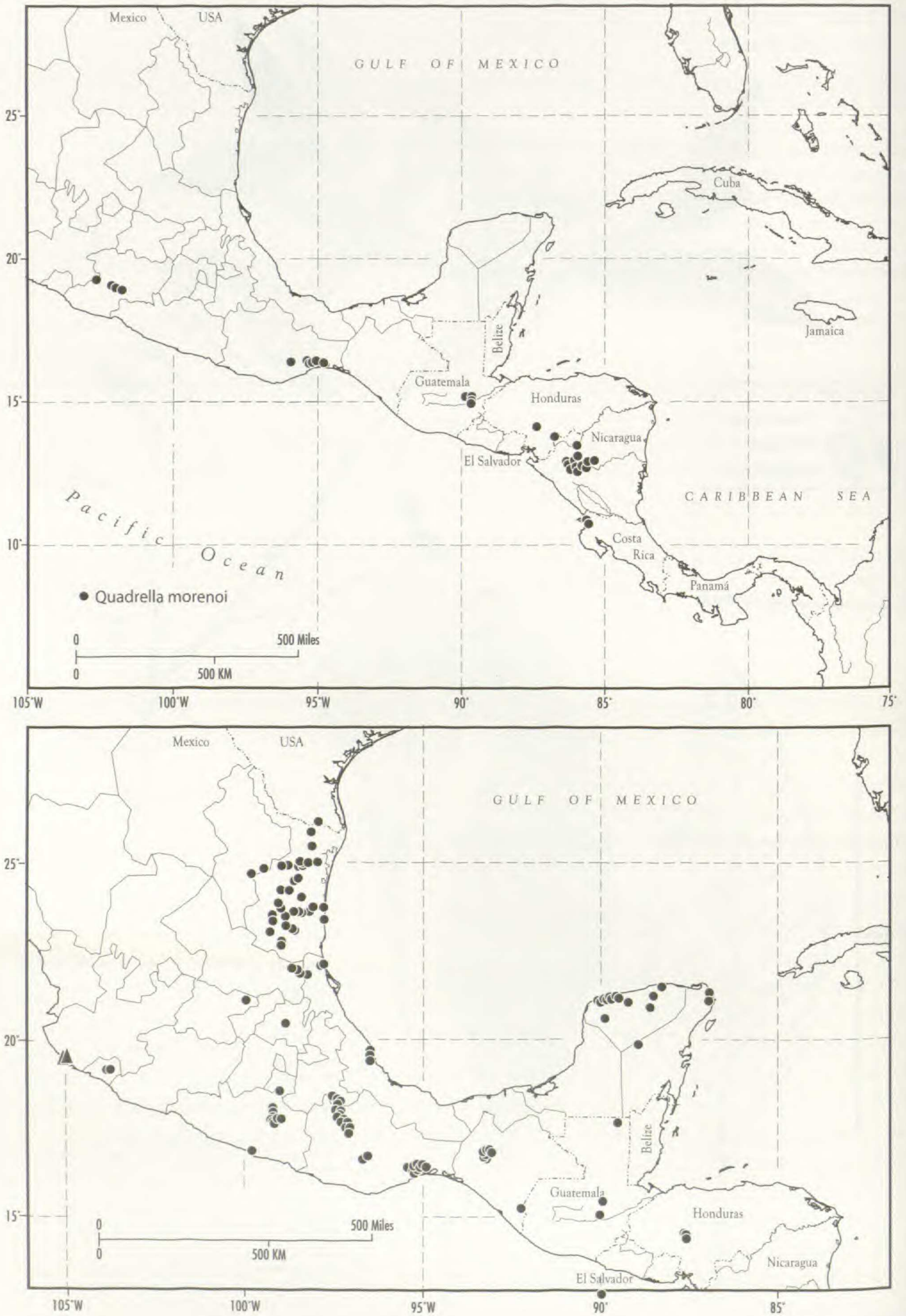


FIG. 9. Upper map: Distribution of *Quadrella morenoi* (solid circles). Lower map: Distribution of *Quadrella incana*: *Q. incana* subsp. *incana* (solid circles), ranging from southern Texas to Honduras; and, *Q. incana* var. *triangularis* (solid triangles) restricted to southern Jalisco, Mexico.

a unique, translucent, thin, papery or membranous testa; by inflorescences borne on much longer peduncles (Fig. 8, vs. 0.4–2.5(–3) cm in *Q. incana*); and by the greater number (7 to 16 vs. 3 to 8) and denser pattern of the lateral veins. This new species is placed in *Quadrella* subgen. *Breyniastrum* (Iltis & Cornejo 2010 b), on account of the stellate pubescence covering the plant throughout and its seeds with green embryos with thin testas.

Quadrella morenoi existed unrecognized for 189 years (since 1821) as part and parcel of the superficially similar *Q. incana*, so in *Flora of Guatemala* (Standley & Steyermark 1946), and the *Flora Arborescente de Costa Rica* (Zamora 1989), but also in the *Flora de Nicaragua* (Iltis 2001), where nevertheless the often solitary seeds and green color of the embryos were first mentioned but not discussed.

Habitat & Distribution.—*Quadrella morenoi* occurs scattered from southern Mexico (Michoacan) to southwestern Costa Rica (Fig. 9, upper map), but is especially common in Central Nicaragua. Only at Tehuantepec in southern Oaxaca, Mexico, this new species overlaps parapatrically the range of the more common *Q. incana*. *Quadrella morenoi* ranges from sea level to 930 m in deciduous thorn scrub, gallery forests and semi-deciduous tropical dry forests and woodlands. It persists in secondary vegetation and grazed areas, often on rocky and volcanic soils.

Vernacular names.—MEXICO (Oaxaca): Arnica (Salas et al. 1310); mata gallina (Cervantes 2168).

Phenology.—Flowering mostly from February to July (rarely in November), and fruiting mostly from May into September (rarely in February).

Seed morphology.—Unlike the one to six seeds of *Quadrella incana* fruits and those of the related *Q. ferruginea* (L.) Rafinesque complex of the Greater Antilles (Rankin & Greuter 2004), which have their white embryo enclosed by a smooth, relatively thick, hard testa typically cleomoid in shape (i.e., with the seed cleft deeply invaginated between the claws of the cochleate-reniform seed; Fig. 5 J–L), the one to two seeds of *Q. morenoi* (Fig. 5 G–I) have an essentially straight and non-cleomoid green embryo covered by a unique, paper-thin, testa that is not invaginated into the seed and, when fresh or in herbarium material, is easily removed. While the embryos of *Quadrella incana* are whitish or cream, with their very thin cotyledons doubly conduplicate, the deep-green cotyledons of *Q. morenoi* are thicker, somewhat irregularly but simply folded one into the other.

Etymology.—The species is named in honor of Pedro Paul Moreno, the energetic Nicaraguan botanist at HNMN, an avid explorer of the Nicaraguan flora and collector of the type specimens.

IUCN.—The numerous and relatively recent collections of *Quadrella morenoi* indicate that this species deserves a lower concern, LC.

PARATYPES: MEXICO. **Michoacan:** ca. Buenavista Tomatlán, J. Rzedowski 22290 (DS, ENCB, MICH, TEX, WIS); Cortina de la Presa Zicuirán, ca. La Huacana, J. Rzedowski 37368 (ENCB, MEXU, MO). 3 km N de la Presa Zicuirán, carr. Apatzingán-La Huacana, R. Torres & E. Martínez 382 (CAS, MO); Mun. Múgica, along Morelia-Lázaro Cárdenas autopista, V. Steinmann 3130 (MEXU); along MEX 37, ca. 14 km N of Cuatro Caminos, V. & P. Steinmann 1644 (MEXU). **Oaxaca:** San Jerónimo, C. Mell 2204 (NY); 3 km E de San Juan Guigoyache, carr. Oaxaca-Tehuantepec, J. Magallanes 202 (MEXU, WIS); 70 mi SE de Oaxaca, G. Webster 11642 (DAV, MEXU); Distr. Tehuantepec, El Limos (arriba de Chicozapote), H. Hernández & R. Torres 311 (WIS); Paso Alicia, 8 km al NNW de Tehuantepec, R. Torres, R. Cedillo & L. Rico 499 (CAS, MEXU, MO, MU); 2–4 km E of Tehuantepec on rd to Oaxaca (rt 190), R. King 1154 (MICH, NY, TEX, UC, US); along hwy to Tehuantepec (rt 185), R. King 239 (ENCB, MICH, TEX, US, WIS); cerro Guiengola, 11 km NO de Tehuantepec, A. Campos 3754 (MEXU); Mun. de Asunción Ixtaltepec, C. Gallardo & E. Pérez-García 1466 (MEXU); Mun. de Santiago Astata, Barra de la Cruz, M. Elorsa 2199, 2227 (MEXU); Mun. Santo Domingo Tehuantepec, Ejido El Limón, A. Reyes-García, J. Gordon & I. Sánchez 3305 (MEXU); El Limón, I. Trejo 1175 (MEXU); Distr. Yautepec, El Camarón, R. Torres, H. Hernández & P. Morales 5306 (MEXU); Distr. Juchitán, 17 km S de La Ventosa, R. Cedillo 749 (CAS, MO); Distr. Pochutla, Mun. Santa María Huatulco, A. Reyes-García & G. Ibarra 2692 (MEXU); Mun. de San Miguel de Puerto, S. Salas, E. Torres, M. Cerón & R. García 1310 (MEXU); Distr. Jalapa del Marquez, camino Jalapa del Marquez-Santiago Lachigurri, L. Cervantes 2168 (MEXU). **GUATEMALA. Zacapa:** aldea San Jorge, G. Ventura V94.06 (MEXU); vic. Zacapa, P. Standley 73570 (F); Paso de los Jalapa, M. García & F. Ramírez 351 (MEXU). **HONDURAS. Francisco Morazan:** Mun. Morocelí, Quebrada Grande ± 1.5 km N de Morocelí, J. Linares 5516 (MEXU). El Paraíso: Mun. Oropolí, 4 km al pueblo de Oropolí, A. Molina 8585 (F, NY, WIS); el Abra, S. Duery, G. Pilz, J. Linares & R. Martínez 19 (MEXU); drenaje del Río Choluteca, A. Molina 8617 (F, NY, US, WIS). **NICARAGUA. Boaco:** La Cruz, km 60 carr. al Rama, P. Moreno 21517 (WIS); 2 km al NE de Boaquito, P. Moreno 16607 (HNMN, MO, WIS); W slope of Cerro Coyanchigua, W. Stevens 22943 (MO, WIS); 6 km NE de la ciudad de Boaco, A. Grijalva & M. Sandino 2775 (WIS); 1.6 km SW of Santa Cruz, W. Stevens 22907 (MO, WIS); El Ojo de Agua, carr. Santa Lucía, P. Moreno 10104 (WIS). **Managua:** ca. San Francisco Libre,

A. Laguna 246J (MO); La Mojarra, *P. Moreno* 21443 (WIS); vic. Hac. San Jacinto, NE of Managua, *H. Iltis* & *P. Anderson* 30875a (UWSP, WIS). Matagalpa: ca. 1.8 km SW of ford of Río Grande de Matagalpa, *W. Stevens* 9818, 10918 (MO, WIS); entre Waswalí abajo y Waswalí arriba, *P. Moreno* & *W. Robleto* 22899 (WIS); *W. Stevens* & *J. Henrich* 20312 (MO, WIS), *W. Stevens* & *G. Schatz* 21584 (MO, WIS); Camino viejo a Jinotega, *A. Grijalva* & *F. Ortiz* 2826, 2828 (WIS); San Juanillo, ca. 8 km al SE de ciudad Darío, *A. Grijalva* 2600 (WIS); entrada Paso de Carreta, *P. Moreno* 16693 (WIS); carr. Panamericana, caserío Puertas Viejas, *P. Moreno* 718 (WIS); La Aurora, Río Viejo, *M. Castro* 132 (WIS); 3 km E de Puertas Viejas, *P. Moreno* 20107 (WIS); ca. 1.8 km SW of ford of Río Grande de Matagalpa, rd. to Terrabona, *W. Stevens* 9818 (MO, WIS). **Segovia:** Nueva Segovia, *Ørsted* 3160 (C, C fragm. at WIS). **COSTA RICA. Guanacaste:** Cantón Liberia, Parque Nac. Santa Rosa, *R. Espinoza* 462 (INB, WIS); 5 km de la Playa Naranjo, *N. Zamora* 942 (F); slope below Questa, *R. Liesner*, *F. Almeda* & *R. Wilbur* 3396 (MO); ca. 15 km SW of entrance, *R. Wilbur*, *F. Almeda* & *T. Daniel* 22924 (DUKE); ca. 15.8 km beyond the entrance to Parque Nac. Santa Rosa, *F. Almeda*, *R. Wilbur* & *T. Daniel* 108 (CAS); Santa Rosa, *R. Liesner* 4617 (MO).

5b. *Quadrella morenoi* f. *hastata* Iltis, f. nov. TYPE: NICARAGUA: vic. Hac. San Jacinto, NE of Managua, stump sprouts from disturbed shrub and small tree savanna, ca. 100 m, 14 Oct 1991 (st), *H.H. Iltis* & *P. Anderson* 30875 (HOLOTYPE: WIS; ISOTYPES: MO, NHNM, US).

Idem *Quadrella morenoi* Cornejo & Iltis, sed forma juvenilibus cum foliis prominentibus hastatis.

Juvenile branches of a few New World Capparaceae occasionally produce radically different, hastate leaves, in the case of *Q. morenoi* f. *hastata*, with the elongated, 4–15 cm long and 0.4–0.7 cm wide, slender and narrowly-oblong central lobe abruptly diverging at base into two, ± equal, laterally-projecting, rounded basal lobes, these together 1.2–4 cm wide from side to side, and with the whole leaf with as many as 17 main lateral veins on each side of the midrib.

It is of great interest that, while the eight stamens and short ovoid fruits of *Quadrella morenoi* suggest a close relationship to the eight staminate, short- and ovoid-fruited *Q. incana* and the other species of *Quadrella* subg. *Intutis*, its green embryos rather than white, and the frequent occurrence of hastate, juvenile, stump sprout leaves (which never occur in *Q. incana*), are more congruent with the similarly eight staminate, green-embryoned *Q. lundellii* (Standley) Iltis & Cornejo, a co-member of *Quadrella* subg. *Breyniastrum*, for which, despite its elongate capsules, its hastate juvenile leaves provide strong reinforcing evidence for this odd, putative relationship. Another species of subg. *Breyniastrum* with eight stamens, *Quadrella steyermarkii* (Standley) Iltis & Cornejo, nevertheless, does not produce juvenile hastate leaf blades, but rare as it is, they may yet turn up!

Finally, the occurrence of these peculiar leaf forms in *Quadrella morenoi* is reminiscent of the analogous situation in the distantly related *Cynophalla hastata* (Jacq.) J. Presl. However, it is important to note that there is no close relationship whatever between these two genera of American Capparaceae.

PARATYPES: **MEXICO. Michoacan:** 4 mi NW of Apatzingán, *R. McVaugh* 17924 (MICH, WIS); 13 km W of Apatzingán, *J. Rzedowski* 22303 (ENCB, MEXU, WIS). Oaxaca: Chivela, *C. Mell* 35 (US, US fragm. at WIS); Mun. Santo Domingo Tehuantepec, Ejido El Limón, *A. Reyes-García*, *J. Gordon* & *I. Sánchez* 3305 (MEXU). **GUATEMALA. Zacapa:** vic. Zacapa, *P. Standley* 74179 (F), *P. Standley* 74624 (GH, F [2], NY, US). Chiquimula: Between Ramírez and Cumbre de Chiquimula, *P. Standley* 74543 (F, US); near the divide, rd. from Chiquimula to Zacapa, *P. Standley* 71969 (F [2], US). **NICARAGUA. Boaco:** 1 km E de Santa Cruz, *W. Stevens* 22916 (WIS). Hac. San Antonio, carr. a Boaquite, *P. Moreno* 21545 (MO). **COSTA RICA. Guanacaste:** Parque Nac. Santa Rosa, Sendero Carbonal, *A. Fernández* 296 (INB).

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